exit ends of the bundle - the relative spatial coordinates of the cores of the individual fibres. Within this constraint, however, it is acceptable to transform these coordinates between the ends provided an image can still be formed. Thus, for example, the coordinates could be reversed so that a mirror image is formed. Other transformations, as will be apparent to those skilled in this art, are also possible. This constraint (i.e. that an image can be formed) means that the bundle might be termed 'coherent' in the sense that the fibre bundle maintains image orientation; this should not be confused with the coherence of the light from the light source, which refers to the maintenance of light propagation properties within the illuminating fibre.

Further, this condition that the fibre bundle maintains image orientation only relates to the two ends of the fibre bundle. Thus, while a fused fibre bundle may be employed in some applications, in other applications the fibres may not be fused between the ends of the bundle, as long as the ends preserve a sufficient 'coherence' (i.e. image orientation maintenance) for the bundle to function as an imaging bundle. This latter type of bundle also has the advantage of greater flexibility over its length.

It will also be understood that the term "confocal" is employed - as is understood in the art - to include conjugate focal point geometries that may not be purely confocal owing to the finite size of apertures, spatial filters, etc., and the occasional desirability of increasing the amount of detected light even if this means a minor loss of resolution. Such arrangements are nevertheless referred to as confocal (and are embraced by that term herein), as the collected light includes what might be termed 'pure' confocal return light.

The microscope or endoscope may be embodied as an

ophthalmoscope, colonoscope or other optical instrument.

Preferably said microscope or endoscope includes a beam-splitter to diverge said return light, wherein said fibre bundle is located to receive said diverged return light.

Preferably the beam-splitter comprises a simple or compound prism. Alternatively, the beam-splitter could comprise a transmission or reflection diffraction grating.

Preferably said microscope or endoscope includes a further beam-splitter, optically reversed relative to said beam-splitter and located optically after said fibre bundle, to improve focal plane isolation.

Thus, in one embodiment, said beam-splitter comprises a simple or compound prism, and said microscope or endoscope includes a further prism, optically reversed relative to said prism and located optically after said fibre bundle, to improve focal plane isolation.

Preferably said microscope or endoscope includes a spatial filter optically after said fibre bundle. More preferably said spatial filter comprises a variable aperture (such as a pinhole).

Preferably said microscope or endoscope includes a scanner for scanning said coherent light with respect to said sample.

In one embodiment said scanner comprises a mirror, in another said scanner comprises a tuning fork. In one embodiment, said scanner comprises a pivotably mounted member provided with collimating optics for collimating said coherent light.

Preferably said collimating optics comprises a simple or

CLAIMS:

1. A confocal microscope or endoscope, having:

a source of coherent light for illuminating a sample; and

an imaging optical fibre bundle for receiving return light;

whereby said fibre bundle provides a return channel for fluorescent return light.

2. A confocal microscope or endoscope as claimed in claim 1, wherein said optical fibre bundle preserves, between entry and exit ends of said bundle, the relative spatial coordinates of the cores of individual fibres constituting said bundle.

3. A confocal microscope or endoscope as claimed in either claim 1 or 2, wherein said relative spatial coordinates are transformed between said ends such that an image can still be formed.

4. A confocal microscope or endoscope as claimed in claim 3, wherein said coordinates are reversed so that a mirror image is formed.

5. A confocal microscope or endoscope as claimed in any one of the preceding claims, wherein said microscope or endoscope is embodied as an ophthalmoscope.

6. A confocal microscope or endoscope as claimed in any one of the preceding claims, wherein said microscope or endoscope includes a beam-splitter to diverge said return light, wherein said fibre bundle is located to receive said diverged return light.

7. A confocal microscope or endoscope as claimed in claim 6, wherein said beam-splitter comprises a simple or

compound prism.

8. A confocal microscope or endoscope as claimed in claim 6, wherein said beam-splitter comprises a transmission or reflection diffraction grating.

9. A confocal microscope or endoscope as claimed in claim 6, wherein said microscope or endoscope includes a further beam-splitter, optically reversed relative to said beam-splitter and located optically after said fibre bundle, to improve focal plane isolation.

10. A confocal microscope or endoscope as claimed in any one of the preceding claims, wherein said microscope or endoscope includes a spatial filter optically after said fibre bundle.

11. A confocal microscope or endoscope as claimed in claim 10, wherein said spatial filter comprises a variable aperture.

12. A confocal microscope or endoscope as claimed in any one of the preceding claims, wherein said microscope or endoscope includes a scanner for scanning said coherent light with respect to said sample.

13. A confocal microscope or endoscope as claimed in claim 12, wherein said scanner comprises a mirror or a tuning fork.

14. A confocal microscope or endoscope as claimed in claim 12, wherein said scanner comprises a pivotably mounted member provided with collimating optics for collimating said coherent light.

15. A confocal microscope or endoscope as claimed in claim 14, wherein said collimating optics comprises a

simple or compound lens.

16. A confocal microscope or endoscope as claimed in claim 14, wherein said pivotably mounted member is mounted by means of, and is pivotable about, an axle.

17. A confocal microscope or endoscope as claimed in claim 14, wherein said pivotably mounted member is mounted by means of a pair of flexible supports that differ so that said pivotably mounted member can be pivotted by being oscillated.

18. A confocal microscope or endoscope as claimed in claim 17, wherein said flexible supports differ in length.

19. A confocal microscope or endoscope as claimed in any one of the preceding claims, including one or more shallow angle prisms located in an image plane to separate out different spectral bands, and a plurality of fibre bundles, each for receiving a respective spectral band, for producing multiple colour images.

20. A confocal microscope or endoscope as claimed in claim 19, including a plurality of separate photo-detectors, each for detecting a respective spectral band transmitted by a respective one of said fibre bundle.